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Title: Electric fence tape, rope or wire and filament therefor

The invention relates to fence tape, rope or wire according to the introductory part of claim 1, and to a filament according to the introductory part of claim 6.

Such fence tape, rope or wire – which is understood to include strip-  
5 and ribbon-shaped as well as knitted and braided designs – is provided with electrical conductors and, after being installed along an area for keeping animals, is connected to a voltage source. An animal that touches the tape, rope or wire is exposed to the electric voltage generated by that voltage source and as a result gets an electric shock, so that the animal is startled  
10 and is discouraged from touching the fence. The risk that animals leave an area bounded by the fence or damage the fence is thus limited, without the fence needing to be made of robust design.

Important properties of such fence tape, rope or wire are a good conduction of electricity, so that with a voltage source a great length of the  
15 fence can be put under sufficient voltage, and a good resistance to corrosion in combination with repeated mechanical loads, so that the fence can remain installed for a long time without the electrical conductivity falling below a particular minimum value. Of particular importance in this regard is that a sudden failure of the electrical conductivity, as a result of which  
20 parts of the fence are no longer served with voltage, be prevented.

A fence tape, rope or wire and filaments of the initially indicated type are known from European patent specification 0 256 841, which discloses electric tape and wire in which, in addition to a textile support structure, two groups of conductive filaments are incorporated which have different  
25 mechanical and electrical properties, the first group of conductors having better mechanical properties and the other group of conductors having a better electrical conductivity.

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In use, local rupture of the filaments occurs sooner in the filaments from material having a better electrical conductivity than in the filaments from material having better mechanical properties. The latter then constitute bridges across the interruptions of the filaments from the material having the better electrical conductivity. As a result, upon local rupture of the filaments from material having the better electrical conductivity, conductivity losses of the tape, wire or rope as a whole are limited. Nonetheless, in the course of time, there is a considerable deterioration of the total conductivity of the tape, wire or rope and especially under corrosive atmospheric conditions, electrolytic corrosion is still found to have an adverse influence on the practical useful life of the tape, wire or rope.

French patent application 2 625 599 also proposes an electric rope or ribbon which is manufactured from a textile fabric or a braided or twined wire, in which two kinds of conductors are incorporated, of which the first kind has a good conduction and the second kind possesses a high strength. In that application, in addition, as prior art, the use of galvanized iron wire is mentioned. With the latter solution, it is true, a reasonable resistance to mechanical loads and corrosion is achieved, but the electrical conductivity is clearly inferior to that in the solutions discussed hereinabove.

In international patent application WO 98/20505, an electric wire or rope is described which is composed of a core from a non-conductive, strong material, such as a plastic fiber, and a braided outer jacket. The jacket comprises both conductive and non-conductive fibers. The fibers are incorporated in the configuration of a helix in the knitted fabric of the jacket for improving the resistance of the construction against fatigue and damage. The conductive fibers may be manufactured from copper, a copper alloy, another metal provided with a coating from copper, or copper with a coating from another metal. In this electric wire, all conductors are manufactured from a material having a very good electrical conductivity but having less

good mechanical properties than other electrically conductive materials suitable for use in such fence material. As a result, at points where the material is subject to high mechanical loads, as adjacent points of attachment to posts and the like, a complete interruption of the conductivity can easily arise in that all conductors rupture.

The same problem also applies to electric tape or rope known from French patent application 2 681 505. According to this publication, in a textile woven or rope, conductors from a copper/zinc alloy with cadmium are incorporated, the conductors being provided with a nickel coating for preventing corrosion. It is proposed to apply a layer of nickel of 1-3  $\mu\text{m}$  to increase the resistance to corrosion.

In German patent application 197 03 390, a fence rope is described with a conductor consisting of a steel core with a copper jacket.

It is an object of the invention, in respect of fence tape, wire or rope with filaments from different materials, to further limit losses of electrical conductivity as a result of rupture of electrical conductors, without the electrical conductivity in undamaged condition being essentially reduced.

This object is achieved, according to the present invention, by designing a fence tape, wire or rope in accordance with claim 1.

The invention further provides a filament according to claim 6, which is especially arranged for incorporation in fence tape, wire or rope according to claim 1.

Due to the support zone and the conduction zone forming part of the same filament, the conduction zone is highly effectively supported by the support zone, in particular in that the conduction zone forms a core of the at least one filament and the support zone constitutes a jacket enveloping the core.

As a result, undue deformation of the conduction zone is prevented. Rupture of the conduction zone under the influence of mechanical loading of a filament is thereby prevented.